

# Voice Separation: A 15-minute Introduction

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presented by

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# Presentation Outline

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- Introduction
- Voice Separation Techniques
- Voice Separation Systems
- Conclusion
- References

# Introduction

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## ■ Purpose

- Transcription of low-level musical data into score notation
- Theme finding and music analysis

## ■ Idea

- Separation of notes into voices with possible chords (in a polyphonic context)

## ■ 2 different contexts

- **Explicit Polyphony**
  - Multiple notes sounding at one instant
  - Assuming no single voice can produce 2 notes simultaneously
- **Implicit Polyphony**
  - At most one note sounding at any instant

# Techniques

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- Split Point Separation

- Idea:
  - Split pitch range into disjoint intervals
- Problem:
  - Works only on non-overlapping voices
- Notes:
  - One of the simplest methods
  - Used in most commercial systems

# Techniques

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## ■ Rule-Based Approach

- Idea:
  - Take advantage of the voice-leading rules used by composer
  - Rules examples:
    - Polyphonic motion
    - Succeeding notes intervals
- Problems:
  - Many such rules, specific to composer
  - Errors occur with major overlapping of voices
- Note:
  - Better approach than split point

# Techniques

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- Local Optimization Approach

- Idea:

- Using a heuristic algorithm

- Iterative process that finds the best solution from a given set at each step

- Problem:

- Not meant to find the correct voice separation but rather to provide reasonable solutions in different contexts

- Note:

- Complex approach but seems to give better results

# Techniques

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- Others

- Contig Mapping Approach
- Same-Voice Predicate (learned decision tree) along with voice-numbering algorithm
- ...

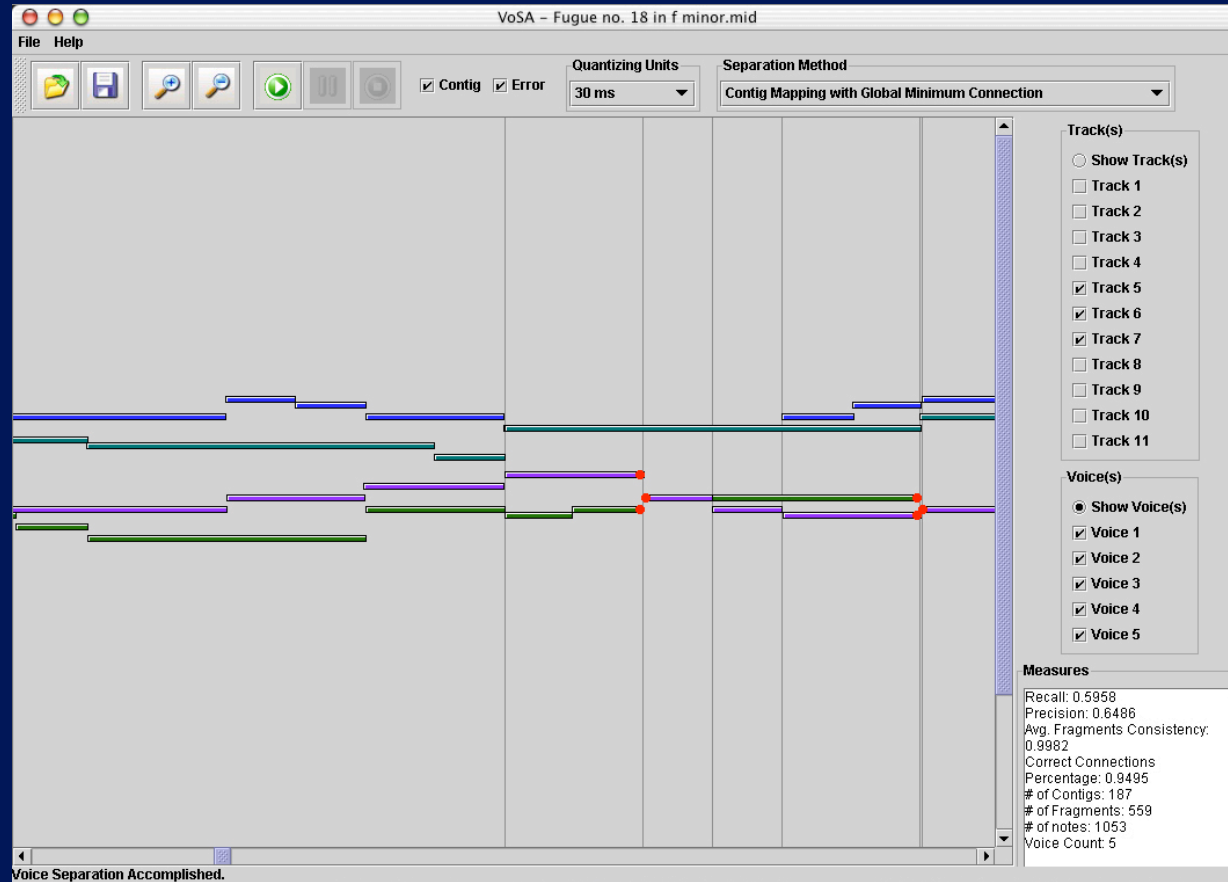
# Systems

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- VoiSe – University of Massachusetts Amherst (Kirlin 2005)
- VoSA – University of Southern California (Chew 2004)
- Melisma Music Analyzer – Carnegie Mellon University (Sleator and Temperley 2001)



# Systems



VoSA Interface Screenshot – from VoSA website

# Conclusion

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- Despite the different existing techniques, there is still no perfect solution to voice separation.

# References

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- Kirlin, P., and P. Utgoff. 2005. VoiSe: Learning to segregate voices in explicit and implicit polyphony. *Proceedings of the International Conference on Music Information Retrieval*. 552–7.
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